



The impact of shipping emissions to urban air quality in Europe

A port-city analysis

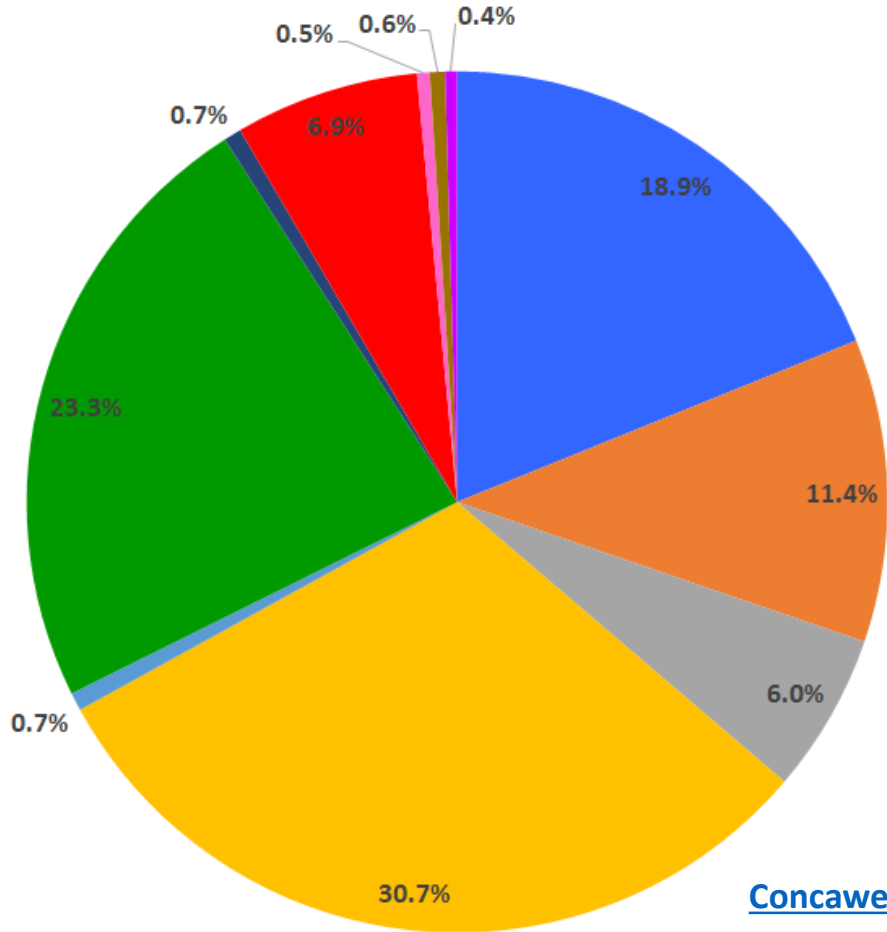
Concawe Symposium

18th March 2024, Brussels, Belgium

Giuseppe Valastro, Science Executive Air Quality

The importance of the emission inventory

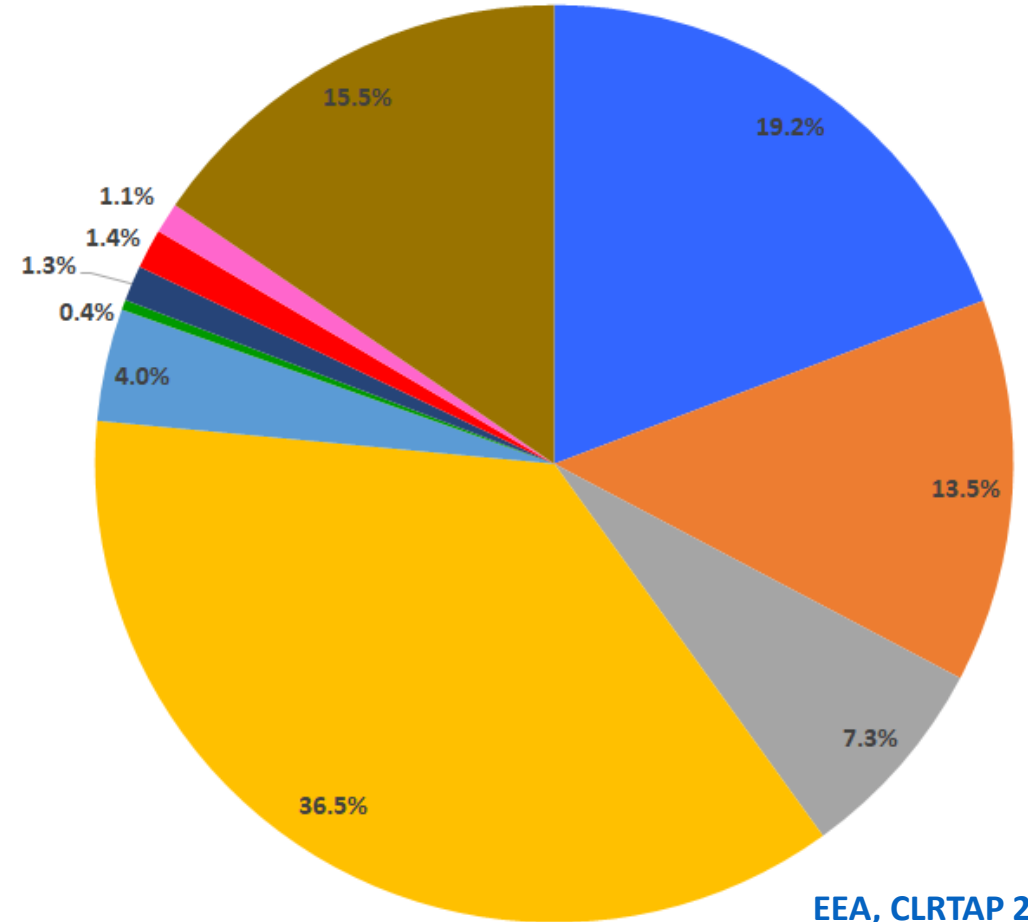
% Sources Contribution to NOx emissions – Europe
(CAMS-REG Concawe Study)



[Concawe Report 2/23](#)

- Energy Supply
- Res. comb.
- Inland Shipping
- Aviation
- Waste
- Wildfire
- Industry
- Road Transport
- International Shipping
- Mobile machinery
- Livestock Manure and storage

% Sources Contribution to NOx emissions – Europe
(EEA, CLRTAP)



[EEA, CLRTAP 2018 data](#)

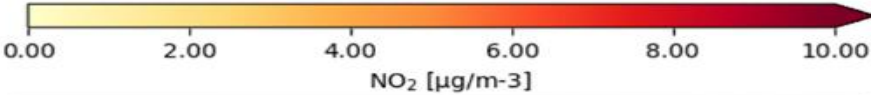
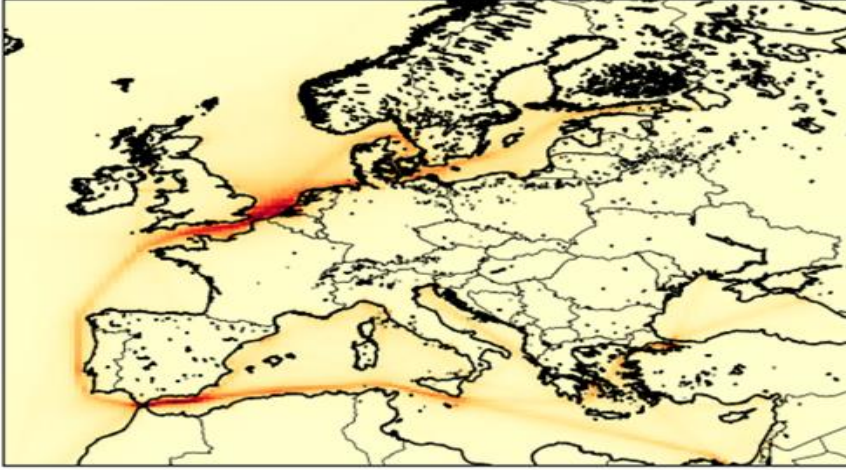
- Energy supply
- Res. comb.
- National navigation
- Aviation
- Waste
- Industry
- Road transport
- International Inland Shipping
- Other transport
- Agriculture



Shipping Contribution to Europe

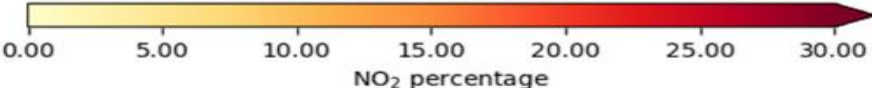
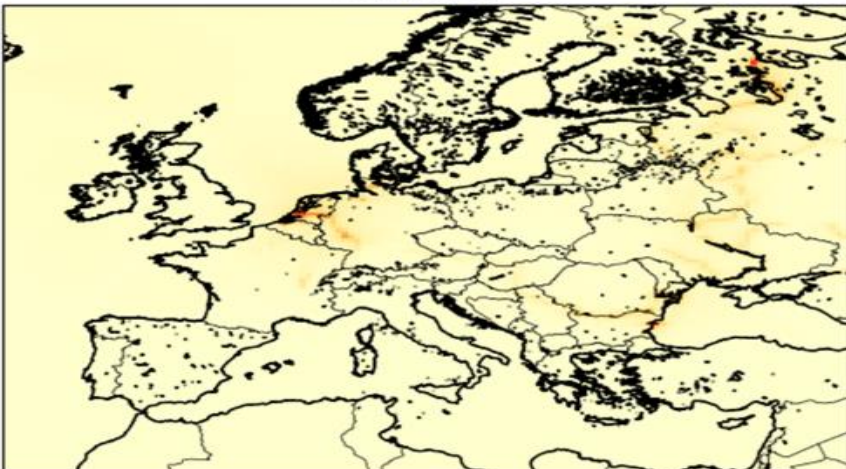
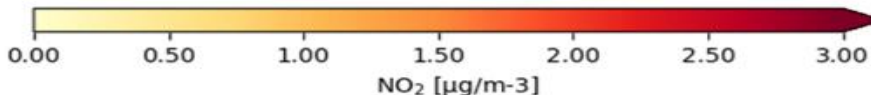
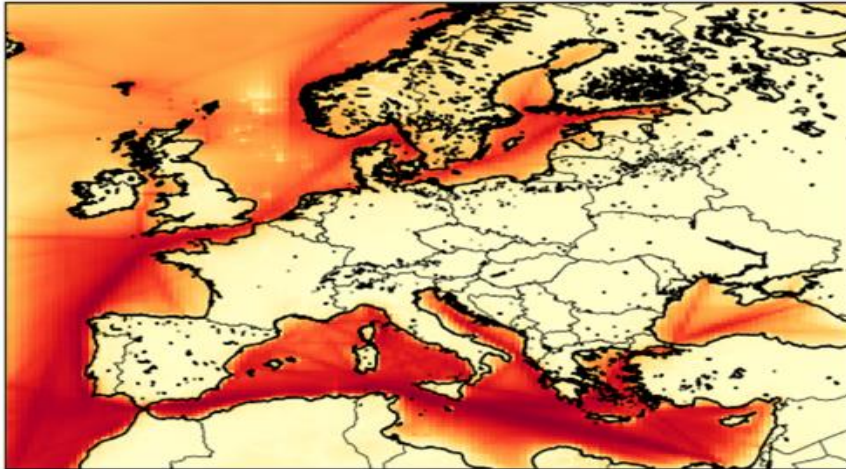
International shipping

Absolute contribution to NO₂ surface concentration



Inland shipping

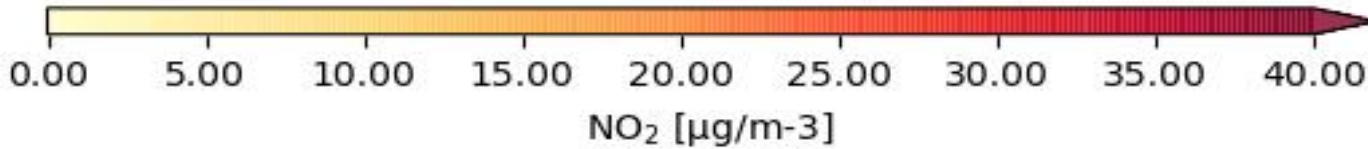
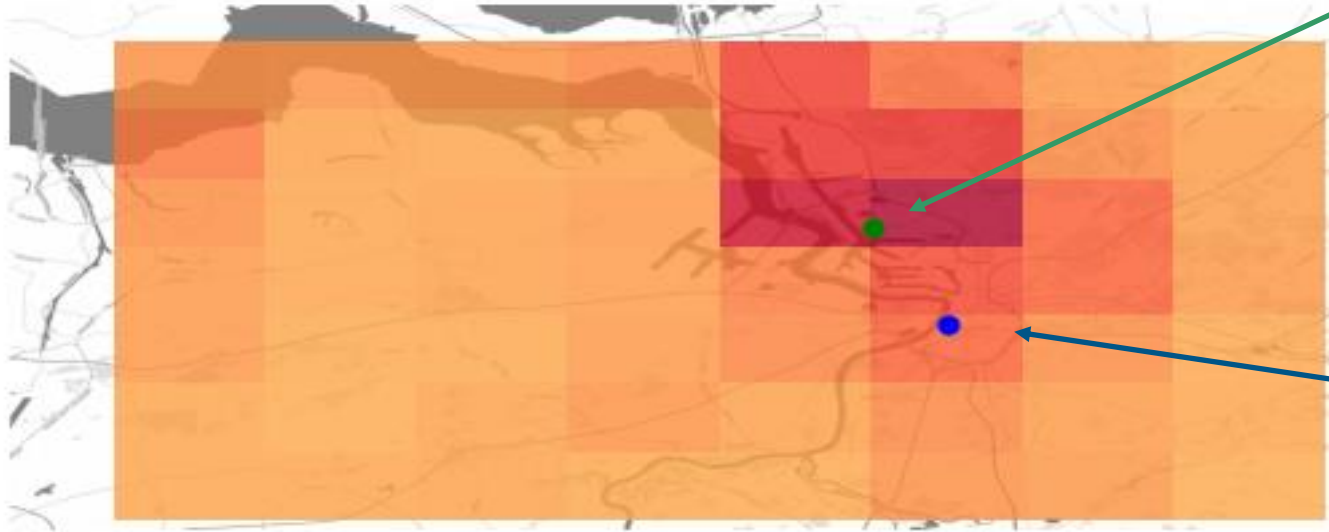
Relative contribution to NO₂ surface concentration



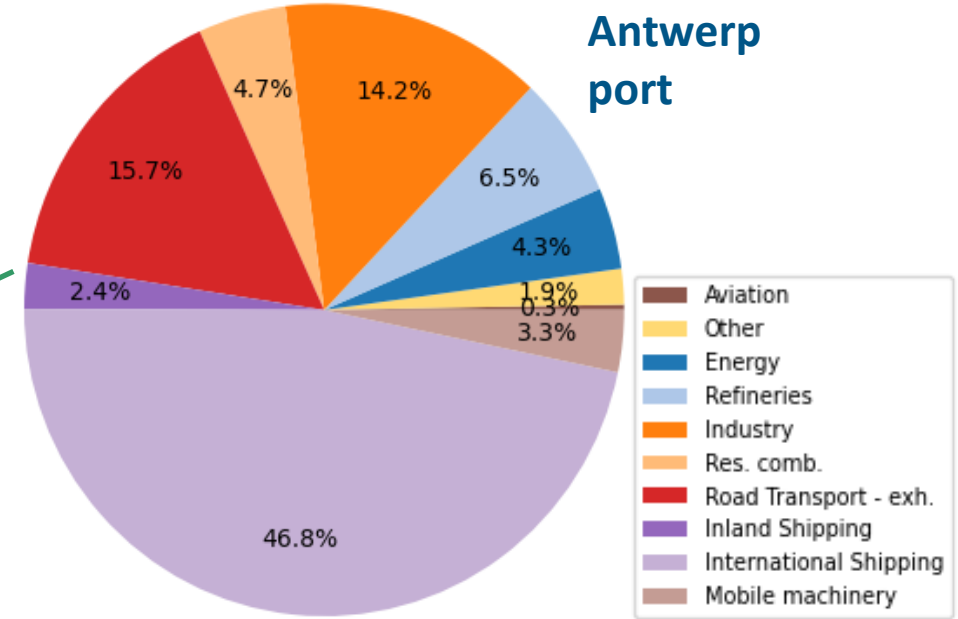
Antwerp

NO₂ annual mean concentration

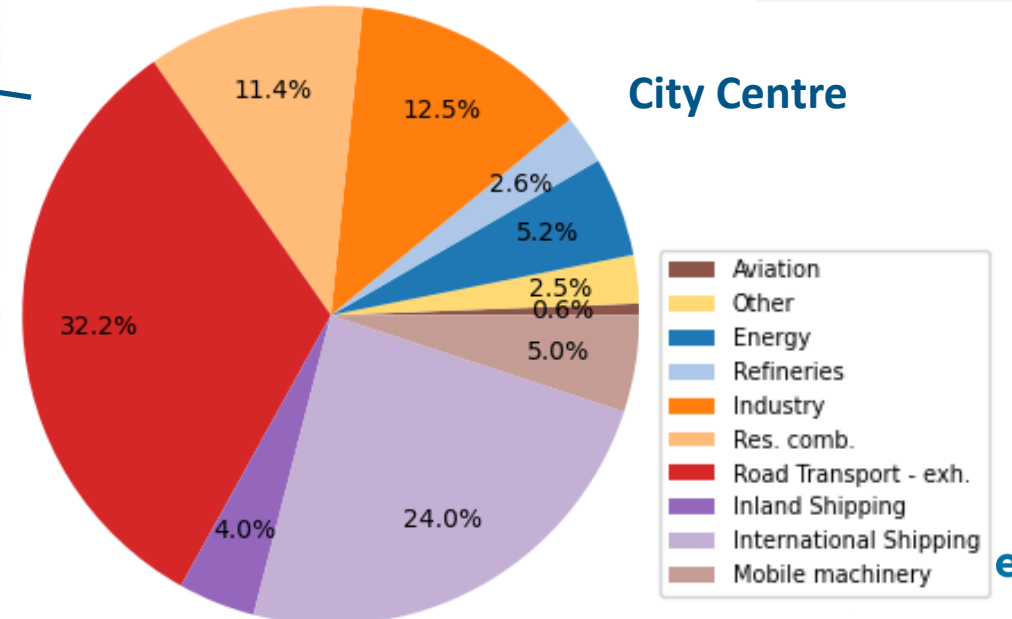
Total concentration of NO₂ in Antwerp



Antwerp port



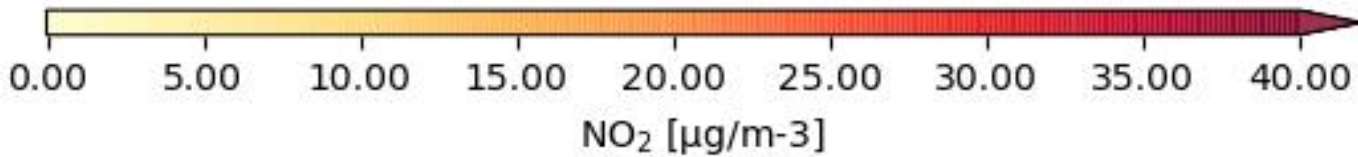
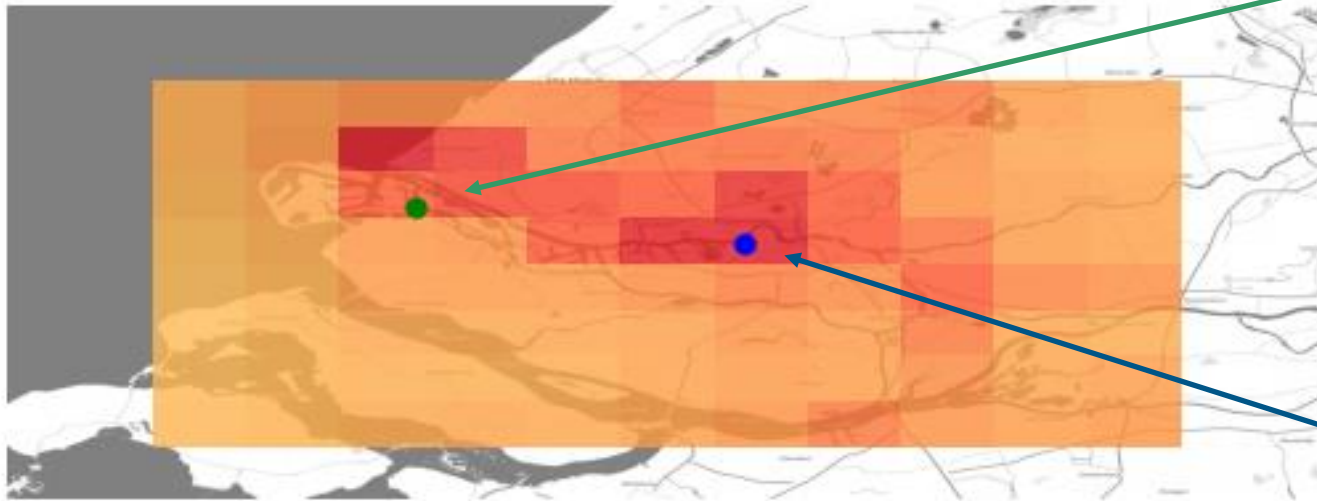
City Centre



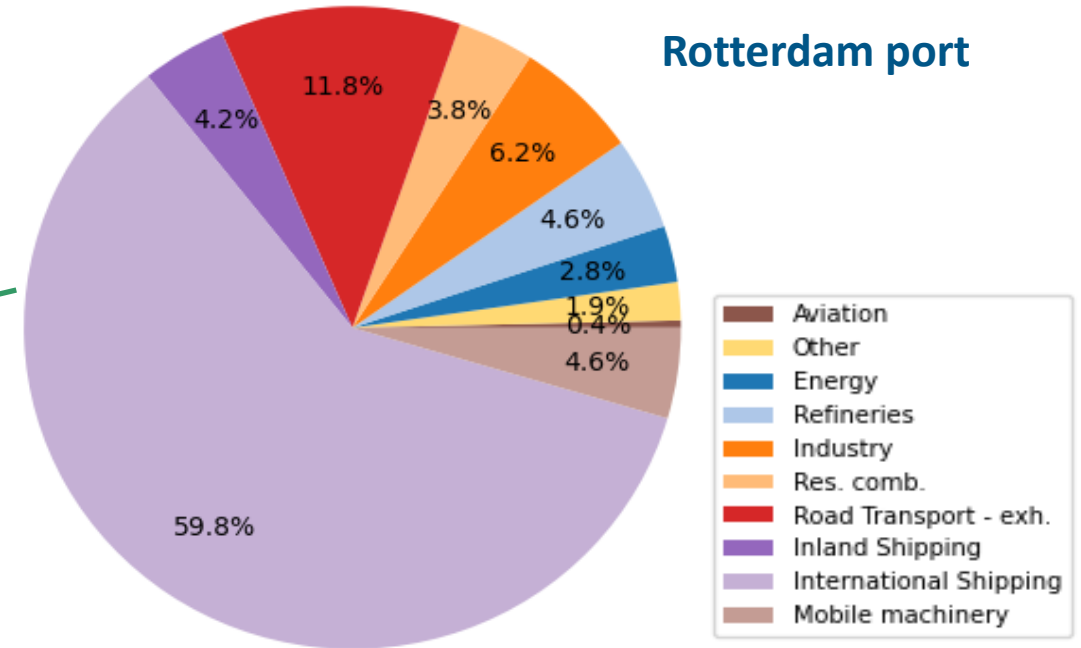
Rotterdam

NO₂ annual mean concentration

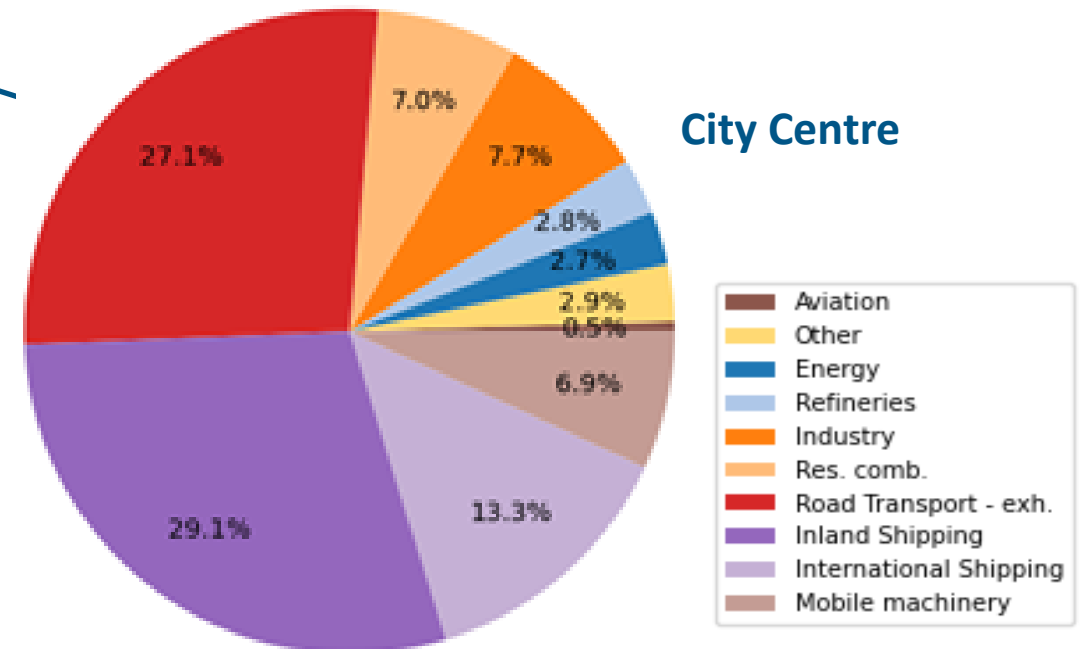
Total concentration of NO₂ in Rotterdam



Rotterdam port



City Centre

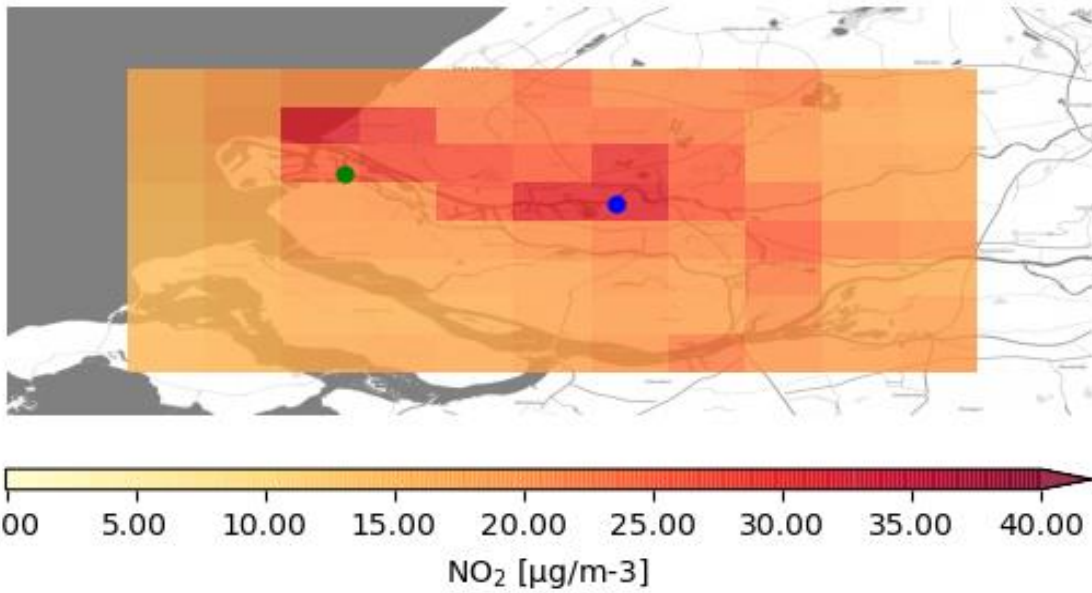


Rotterdam

NO₂ annual mean concentration

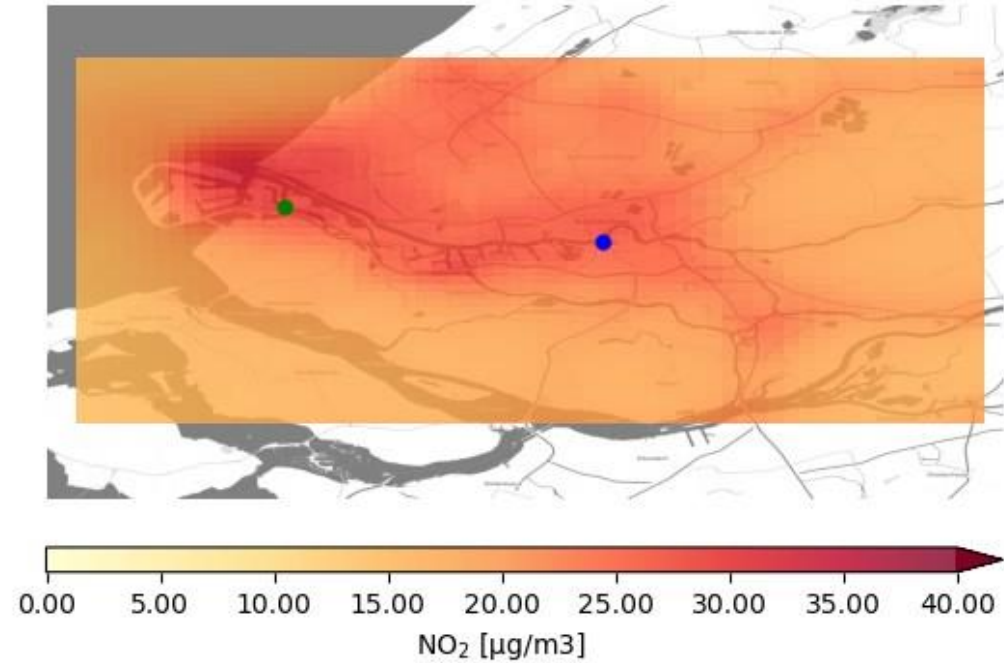
6x6 km resolution

Total concentration of NO₂ in Rotterdam



1x1 km resolution

Annual average NO₂ concentration in Rotterdam





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A port-city analysis Back up

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Shipping Emissions - Different Approaches

Concawe Study Objective:

Assess how shipping emissions influence air quality over port cities, in comparison to other sectors.

- Modelling study undertaken by TNO using LOTOS-EUROS model and its source apportionment capabilities
- Seagoing emissions from the FMI STEAM model, based on actual ship movements as registered by the AIS data
- Inland shipping based on MS reported data but complemented with spatial distribution using STEAM

MS Reported Data, CLRTAP

- National emission totals account only emissions from shipping between the national harbours.
- Emissions from seagoing shipping leaving/coming from another country are accounted for in so-called **memo-item “International maritime navigation”** (EEA, 2019) and are based on bunker sales
- However emissions cannot be attributed to a specific country as take place at sea in international waters, cannot be included in the national inventories nor be used in air quality calculations as the location where the emissions occur is not known (not geographical referenced).

